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The Mediating Role of Perceived Cooperative Communication in the Relationship between Interpersonal Exchange Relationships and Perceived Group Cohesion

Hassan Abu Bakar[1] and Vivian C. Sheer[2]

Abstract

This study develops a multilevel model to advance research on interpersonal exchange relationships among supervisors, subordinates, and coworkers by integrating leader–member exchange (LMX), team–member exchange (TMX), and perceived cooperative communication. The model was tested by using hierarchical linear modeling (HLM) with data obtained from a sample of 375 manager–employee dyads working in 48 groups in Malaysia. At the individual level, LMX was found to be related to TMX; at the team-level, the relationship between the LMX-perceived cohesion link and the TMX-perceived cohesion link was mediated by perceived cooperative communication. These findings validated the proposed model and, in

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particular, empirically confirmed the central role of communication in LMX processes in workgroups. Practical implications are discussed.

Keywords
leader–member exchange, team–member exchange, cooperative communication, group cohesion

A work team/group is defined as two or more individuals who perform interdependent tasks to achieve mutually accountable, collective outcomes (Kozlowski & Ilgen, 2006). With the proliferation of workgroups in organizations, managers' roles have expanded from managing individuals to managing groups. Members of a workgroup are motivated to maintain close relationships with their supervisor and coworkers for task completion and goal attainment (Sparrowe & Liden, 2005). Such relationships can be conceptualized in terms of the quality of leader–member exchange (LMX, Graen & Uhl-Bien, 1995) and team–member exchange (TMX, Seers, 1989). Previous research suggests that LMX likely influences TMX and group cooperative communication and cohesion; the relationships among these constructs, however, have not been portrayed explicitly in a theoretical model, nor have they been empirically tested (e.g., Graen & Uhl-Bien, 1995; Liao & Chuang, 2007; Liden, Wayne, & Sparrowe, 2000).

Furthermore, previous research on group cohesion/attachment has focused on the team/group as the unit of analysis without considering the dynamic interplay of individuals within a workgroup *and* the group as a whole (Ballinger & Schoorman, 2007; Chen & Klimoski, 2003). A theoretical model then must be developed and tested to address how group relationship structure, that is, leader–member relationship (LMX) and coworker relationship (TMX), influences cooperative communication and group cohesion (Bollen & Hoyle, 1990; Paxton & Moody, 2003).

In the present study, we develop a multilevel model that specifies the linkages among LMX, TMX, perceived cooperative communication, and perceived group cohesion in a workgroup context. With a communication-centered approach, we hypothesized cooperative communication as a process variable that mediates the relationship between LMX and other group variables. This line of research answers Sias' (2005) call to identify the underlying process variables linking LMX and important workgroup outcomes. Exploring these relationships using causality-based multilevel analysis is both theoretically and practically imperative because such analysis provides a realistic picture

of the interpersonal exchange relationships between supervisors and subordinates and among coworkers in workgroups.

Finally, previous researches on LMX and TMX have been conducted in predominantly Western contexts. In the few studies that had non-Western samples, communication has been overlooked (e.g., Chen, 2005; Chen, Tjosvold, & Liu, 2006). Thus, we test our communication-centered model using members of organizations in Malaysia. Unlike many other homogeneous Asian countries (e.g., China, Japan, and Korea), Malaysia is rather heterogeneous in its cultural and ethnic composition, which includes Bumiputra (including Malays and other indigenous people), Chinese, Indians, and several other smaller ethnic groups. Our findings contribute to the LMX and TMX literature from a communication perspective with evidence from a non-Western population.

Leader–Member Exchange

Leader–member exchange theory suggests that a leader develops a unique dyadic relationship with each subordinate due to the role-making process that involves negotiating and exchanging (Graen & Scandura, 1987). The quality of supervisor–subordinate exchange relationship exhibits an impact on communication within workgroups (Sias & Jablin, 1995). Differences in the quality of LMX relationships shape the perceptions of each party in workgroups. These perceptions then influence interpersonal communication, which, in turn, reinforces perceptions of workplace relationships (Lee, 2005). Researchers (e.g., Bakar, Dilbeck, & McCroskey, 2010; Sias, 2005) have found that managers' differential treatment of subordinates (i.e., differed quality of LMX relationships) resulted in subordinates' talking about these treatments among themselves, thereby solidifying their perceptions of unfairness. Such processes likely weaken group cohesion. Most LMX research, gauging only one party's perspective, has failed to capture the dyadic nature of LMX (Schiresheim, Castro, Zhou, & Yammarino, 2001). The extent to which the supervisor and the subordinate agree on their relationship quality would provide a more complete picture of supervisor–subordinate relationship. Thus, we use LMX agreement to better analyze the leader–member exchange relationship.

Team–Member Exchange

Focusing on social exchange in a team/group environment, TMX commonly refers to the extent to which information, help, and recognition between a member and other members of the workgroup is reciprocal. Seers (1989)

conceptualized TMX as an employee's view of the quality of working relationships with other team members. Unlike LMX, TMX, which involves voluntary exchanges between one member and the rest of the group, is not dyadic. Rather than following the leader, each member chooses to interact with others in his or her own way. Thus, workplace exchange relationships among team members can be considered a uniquely individual perception (Tse, Dasborough, & Ashkanasy, 2008). In this vein, TMX involves a member's assessment of the overall quality of his or her exchange relationships with the rest of the team members. In measuring TMX, a researcher must include a member's perception of (a) his or her willingness to assist other members and share ideas and feedback and in turn; and (b) how readily information, help, and recognition he/she receives from other members (Seers, 1989; Seers, Petty, & Cashman, 1995).

Thus, the quality of a TMX relationship can indicate the effectiveness of member-cooperation within a workgroup. Logically, if the perceptions of TMX are uniformly high within a group, the group can be regarded as both cohesive and well coordinated among its members. Furthermore, the perceptions of high-quality TMX can lead to positive interactions (such as cooperative communication), which, too, reinforce a strong sense of group cohesion.

Cooperative Communication

Cooperative communication in the workgroup refers to members' message exchange behaviors and activities designed to facilitate the joint achievement of workgroup goals (Lee, 1997, 2001). Individual members' cooperative communication behaviors include exchanging information, exhibiting willingness to share ideas and resources, giving encouragement, expressing concerns about others, and showing interest in other members, exhibiting responsiveness to each other, manifesting mutual support and sensitivity, and compromising and negotiating to achieve agreement for group goals (Tjosvold, Johnson, & Johnson, 1984; Chen, Tjosvold, & Liu, 2006). The communication literature (e.g., Kramer, 2004; Sias & Jablin, 1995) suggests that cooperative communication climate within the workgroup impacts group dynamics. Group communication quality was found to reinforce members' perceptions of group dynamics directly (Lee, 2005) and contribute to interpersonal relationships and positive organizational outcomes (Pilemer et al., 2003)

Lepine and Van Dyne (2001) argued that differences in individuals can affect cooperative behavior in a workgroup such that stronger individuals are likely to exert stronger influences. The manager, being the leader of a workgroup, naturally has the legitimate advantage of shaping group cooperative behavior. Yet, not all managers are equal in exerting influence; those with

stronger LMX relationships tend to spur cooperative communication that leads to group cohesion (Lee, 1997). Cooperative communication is considered as a vital factor that mediates the relationship between supervisor–subordinate exchange quality and coworker exchange quality (Lee, 2005).

Group Cohesion

Cohesion is often regarded as an important determinant of workgroup performance (Bollen & Hoyle, 1990). Group cohesion can be defined as the degree to which an individual feels a sense of belonging to a particular group and his/her feelings and values are closely associated with other members of the group (Bollen & Hoyle, 1990; Chen, Tang, & Wang, 2009). O'Reilly, Cladwell, and Barnett (1989) argued that cohesion is an essential component of a group's overall social integration and can be evaluated based on group members' sense of attraction to the group and their satisfaction with social interactions with other members. Group cohesion, an essential workgroup characteristic, is primarily associated with the context in which individual group members are affected by each other's actions (Bowler & Brass, 2006; Chen, Tang, & Wang, 2009). As the stability of a group typically can be described by the degree of cohesion, we treat cohesion as an outcome group behavior. With a communication-centered approach, we propose a two-tiered theoretical model to examine the intricate relationships among LMX, TMX, and cooperative communication.

A Multilevel Model of Perceived Cooperative Communication as the Mediator

Premised upon Karl Weick's (1969) theory of organizing, our central thesis treats communication as the essential binding force of all activities in a workgroup. Task-oriented, cooperative communication then is the dynamic connecting tissue of goal-oriented group behavior. We propose a two-tier model in which we place LMX and TMX at the individual level and cooperative communication and cohesion at the group level, and treat cooperative communication as the mediator and cohesion as the outcome behavior (see Figure 1).

Our two-tiered model is also based on social network theories' central notion (e.g., Monge & Contractor, 2003) that the nested organizational structure can shape group behavior. Specifically, workgroups, embedded in organizations, contain dyads and individual members. Organizational characteristics (e.g., industry sector, nature of business) impact workgroups; while the group context (e.g., climate) influences dyads, individual members,

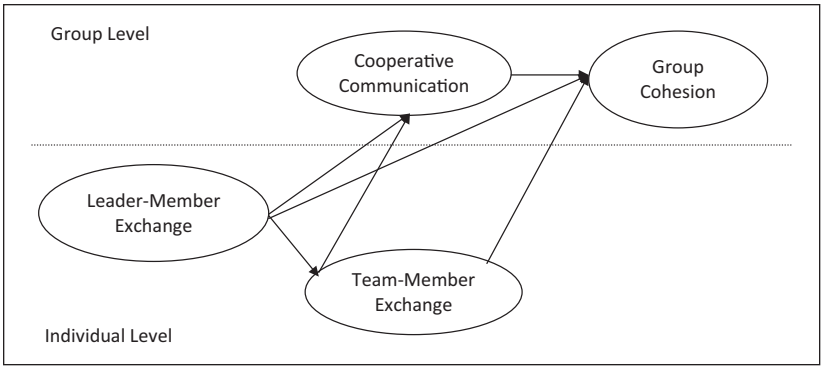

Figure 1. A Multilevel Model of Interpersonal Exchange Relationships, Cooperative Communication, and Group Cohesion.

and their interactions in the group. Different group contexts (e.g., types of workgroups) contribute to differed LMX, TMX, communication, and relationship quality (see Contractor, Wasserman, & Faust, 2006), which likely influence differently each member's desire and actions to maintain his or her membership and work towards group goals (thus, group cohesion, Chua, Ingram, & Morris, 2008). Group members' perceptions of cohesiveness and the group interaction process are likely resulted from at least two levels of influence: between-groups differences (e.g., industry sector and types of workgroups) and social exchange within the group.

LMX and TMX as Individual-Anchored Constructs

As LMXs occur within the participating dyads, the perception of a LMX relationship can be considered from the viewpoint of either the leader or the subordinate. However, LMX perception from either party may be clouded with personal bias and limitation, we argue that an unbiased assessment must involve the shared views of both parties, which Schriesheim et al., (2001) term as "dyadic LMX agreement." We anchor dyadic agreement to the leader who is the common denominator of LMX relationships in a group. Defined as an individual member's perception of voluntary interaction and exchange within a workgroup (Seers, 1989), TMX is treated as an individual-anchored construct in our model.

One's leadership position allows a manager to set a good or bad example for employees and define the tone for interactions with the workgroup. The nature of a LMX relationship subsequently influences the way in which a

member interacts with other workgroup members (i.e., TMX). By the same token, LMX should have a direct effect on group cooperative communication and group cohesion. Thus, LMX is treated as the only exogenous variable in the model.

Perceived Cooperative Communication as the Connecting Mediator

Tjosvold et al. (1984) suggested that cooperative communication links formal, informal, vertical, and lateral interactions and is fundamental to any organized system, such as workgroups. On this basis, we treat cooperative communication as a group-level construct. Communication exchange between the supervisor and the subordinate has predicted cooperative communication (Bakar et al., 2010; Chen & Klimoski, 2003). Scholars (e.g., Sherony & Green, 2002; Sias, 2005) asserted that cooperative communication is a powerful mechanism that can either hinder or facilitate team effectiveness. In our model, cooperative communication, directly influenced by LMX, exerts an immediate impact on group cohesion. Likewise, the connecting mechanism of cooperative communication is reflected in its mediating role between TMX and group cohesion. Naturally, better TMX relationships nurture cooperative communication within the group, which, in turn, enhances group cohesion.

Cohesion as Group Outcome Behavior

Consistent with Cogliser and Schriesheim's (2000) conceptualization, we consider cohesiveness as a group-level construct. The identity of a group can be easily recognized when its internal cohesion is high. We thus regard cohesion as an important group outcome variable. The variation in cohesion is likely attributable to members' interactions within a group (within-group effects) *and* the group's distinct properties that separate this group from other groups (between-groups effects). Thus far, we have established that LMX shapes TMX, and LMX and TMX both contribute to cooperative communication. Together, LMX, TMX, and cooperative communication lead to group cohesion.

Researchers (e.g., Cogliser & Schriesheim, 2000, Seers et al., 1995) contend that a group's internal history, the functions of group types (e.g., sales teams vs. manufacturing teams), and the group's industry sector (e.g., finance vs. health care) can cause groups to behave differently. Our model thus assumes that group cohesion is attributable to both within- and between-groups sources of influence. Through a two-tiered model, we can

avoid improperly rejecting or not rejecting a null hypothesis (Type I and Type II error) due to inappropriately treating between-groups effects as error variance, a common practice in conventional, one-level structural modeling. Thus, a multilevel model of group behavior provides a significant advantage over a conventional structural model (Raudenbusch & Bryk, 2002).

With a primary interest in cooperative communication, we expect this construct to influence relationships between LMX-perceived cohesion and TMX-perceived cohesion within the workgroup. Two hypotheses were proposed.

Hypothesis 1 (H1): Perceived cooperative communication at group-level will mediate the LMX-perceived cohesion relationship.

Hypothesis 2 (H2): Perceived cooperative communication at group-level will mediate the TMX-perceived cohesion relationship.

Method

Sample and Procedure

The participants were employees and their immediate managers in small and medium manufacturing sectors (e.g., incinerator, electronic components and machinery, confectionary, textile, printing, and health care products) throughout Malaysia. The differing functions of each industry allowed variations needed for multilevel modeling and analysis. Participants had a range of jobs that included handling customer complaints, design, production, staffing, marketing, sales, and security system maintenance. Managers' job responsibilities included junior employee mentoring, performance evaluation, job allocation, employee rotation, and delivery of services to customers. Consistent with the minimum time period typically needed to develop a mature workplace relationship, our sample excluded managers who had been in the position for less than 6 months, and employees who had been in their workgroup for less than 6 months (see Graen & Uhl-Bien, 1995). This ensured that both the employees and their mangers were sufficiently familiar with each other and had developed exchange relationships.

Survey packs were sent to respondents via the Small and Medium Industry Development Corporation, an organization the Ministry of International Trade and Industry established to facilitate the growth of small and medium industries. Prior to the survey, we matched supervisor–subordinate dyads based on a complete list of employees given by the Human Resources Department of each participating organization. A cover letter outlined the

research process, solicited voluntary participation, and assured confidentiality. The survey pack contained questionnaires and preaddressed envelopes for participants to return the completed questionnaires directly.

Of the 3,500 questionnaires sent to employees, 375 were returned, a 11% response rate. In that employee sample, 56% were male and 44% female; 30% were ethnically Malay (Bumiputra), 50% Chinese, 15% Indians, and 2% others (e.g., Indonesian and Bangladeshi). Approximately 40% of the participants had worked for the current manager for 3 to 5 years, 54% for 6 to 8 years, and 6% for 9 to 11 years. Of the 500 questionnaires distributed to managers, 48 (a 9% response rate) questionnaires were returned. The 48 mangers represented 48 workgroups of 7 to 10 subordinates each. In the manager sample, 56% were male and 44% female; roughly 20% were ethically Malay (Bumiputra), 56% Chinese, and 24% Indians. With respect to organizational tenure, half had been employed in the organization for 6 to 8 years, and the other half for more than 8 years.

The employees' questionnaires were matched to their managers' with a coding system based on the information the participating Human Resources departments provided. The final sample of dyads reached 375 for 48 workgroups (See Table 1 for details). To examine possible sampling bias, we compared sample means for the usable cases and those cases dropped due to unmatched questionnaires for all study variables. Our analysis of variance procedures did not yield any significant different means for the two groups, indicating little sample bias.

Instrumentation

All questionnaires were in English. We followed the commonly accepted practice of using English language questionnaires in surveys in Malaysia (e.g., Bochner, 1994; Schumaker & Barraclough, 1989), as Malaysians, particularly those in the business sector, are fluent in English (see Lim, 2001). The employee version of the questionnaires consisted of measures of perceived LMX, TMX, cooperative communication, and group cohesion. The manager version included supervisor perceptions of LMX (abbreviated as SLMX), TMX, cooperative communication, and group cohesion. Each manager rated SLMX with 7 to 10 supervisees (his/her span of control). Later in statistical analysis, managers' and employees' responses were matched and compared. Both versions of the questionnaire include items on workgroup size, organization size, and participant demographic information and work history.

Table 1. Questionnaires Sent and Received From the Sample of Dyads.

Number of Workgroups	Questionnaires Sent Per Group	Questionnaires Received (%) Per Group
2	14	9 (64%)
6	15	9 (60%)
1	14	8 (57%)
9	15	8 (53%)
1	17	9 (52%)
4	18	9 (50%)
2	14	7 (50%)
1	17	8 (47%)
9	15	7 (46%)
1	20	9 (45%)
2	18	8 (44%)
6	18	7 (38%)
4	20	7 (35%)
Total 48	760	375

Leader–Member Exchange (LMX). We measured LMX with the widely used multidimensional LMX scale by Liden and Maslyn (1998). The 12-item scale measuring the subordinates' perspective, known as LMX-MDM, yielded a Cronbach's α of .87; the 12-item scale measuring the supervisors' perspective, known as SLMX-MDM, reached an α of .90. With the assumption that "neither the supervisor nor the subordinate compares his/her dyadic relationship to any other relationship within the workgroup" (Schriesheim, Castro, Zhou, & Yammarino, 2001, p. 531), we followed steps outlined by Schriesheim and his colleagues for the individuals' within- and between-dyads analysis. Within-dyad LMX is the agreement of the scores of a supervisor and a subordinate in a given dyad. We calculated between-dyads scores by averaging the responses on the scales of LMX-MDM for both the supervisor and the subordinate. Since each supervisor had more than one subordinate, the within-dyad score was computed by subtracting the between score for either party from the other's corresponding score. We subtracted the subordinate's score from the supervisor's. This approach resulted in agreement scores for LMX-MDM, which ranged from −3.23 to 4.00. A negative score indicated that the supervisor's value was lower than that of the subordinate.

Team–Member Exchange (TMX). Following Dose (1999) and Tse, Dasborough, and Ashkanasy (2008), we conceptualize and measure TMX as an

individual construct in this study. TMX was measured with a 12-item scale by Seers et al. (1995). A reliability analysis generated a Cronbach's α of .89.

Perceived Cooperative Communication. In the previous studies, cooperative communication has been measured via the self-report method with items examining individual members' perception of cooperative communication. Lee's (1997, 2001) 7-item scale was used to measure group perceived cooperative communication. The Cronbach's α was .80.

Cohesion. Participants' perceived group cohesion was measured with a scale developed by Bollen and Hoyle (1990). The 6-item scale reached a Cronbach's α of .83.

All items measuring these four constructs used a Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). See items of each scale in Table 2.

Data Analysis and Results

Prior to conducting hypothesis testing, we tested the data for entry errors and normality (based on kurtosis and skewedness) of the distribution of each item and the composite score of each variable. The majority of the items appeared within normal ranges. Descriptive statistics and correlations for all variables are reported in Table 3.

Confirmatory Factor Analysis

We conducted a confirmatory factor analysis to determine the distinctiveness of the five variables: LMX-MDM, SLMX-MDM, TMX, perceived cooperative communication (PCC), and perceived cohesion. A hypothesized five-factor structure with distinct, correlated factors for LMX-MDM, SLMX-MDM, TMX, PCC, and perceived cohesion was compared with a series of possible models: (a) a four-factor model, in which the items of LMX-MDM, SLMX-MDM, TMX, and PCC were loaded on a common factor; (b) a three-factor model, in which the items of TMX, PCC, and perceived cohesion were loaded on one factor; and (c) a one-factor model, in which all items were loaded on one factor. The results, shown in Table 4, indicated that the five-factor model, with LMX-MDM, SLMX-MDM, TMX, PCC, and perceived cohesion items loading on unique factors, produced the best fit of all alternative models: χ^2 (42, N = 375) = 208.70, $p < .01$, comparative fit index = .97, normed fit index = .99, standardized root-mean-square residual = .04, and root-mean-square error for approximation = .09. All items loaded significantly on their

Table 2. Standardized Factor Loadings of Items Measuring the Five Theoretical Constructs.

Scales	Factor Loadings
LMX MDM	
Affect	
I like my supervisor very much as a person.	.82*
My supervisor is the kind of person one would like to have as a friend.	.78*
My supervisor is a lot of fun to work with.	.73*
Loyalty	
My supervisor defends my work actions to a superior, even without complete knowledge of the issue in question.	.60*
My supervisor would come to my defense if I were "attacked" by others.	.70*
My supervisor would defend me to others in the organization if I made an honest mistake.	.83*
Contribution	
I do work for my supervisor that goes beyond what is specified in my job description.	.77*
I am willing to apply extra efforts, beyond those normally required, to further the interests of my workgroup.	.76*
I do not mind working my hardest for my supervisor.	.84*
Professional respect	
I am impressed with my supervisor's knowledge of his/ her job.	.84*
I respect my supervisor's knowledge of and competence on the job.	.88*
I admire my supervisor's professional skills.	.90*
SLMX-MDM	
Affect	
I like my subordinate very much as a person.	.72*
My subordinate is the kind of person one would like to have as a friend.	.67*
My subordinate is a lot of fun to work with	.55*
Loyalty	
My subordinate would come to my defense if I were criticized by others	.52*
My subordinate would defend me to others in the organization if I made an honest mistake.	.58*
My subordinate would defend my work actions to others in the organization, even without complete knowledge of the issue in question.	.57*
Contribution	
My subordinate does work for me that goes beyond what is specified in his/her job description.	.60*
My subordinate does not mind working his/her hardest for me.	.79*

(continued)

Table 2. (continued)

Scales	Factor Loadings
My subordinate is willing to apply extra efforts, beyond those normally required, to meet my work goals.	.77*
Professional respect	
I am impressed with my subordinate's knowledge of his/ her job.	.61*
I seek out this employee's opinion on important job-related matters.	.61*
I admire my subordinate's work-related skills.	.67*
TMX	
Others help me learn better work methods	.62*
Others help me know what they expect from me	.84*
I suggest a better work method to my coworkers	.61*
Others let me know when I affect their work	.92*
I let others know when they affect my work	.61*
Other members recognize my potential	.75*
Coworkers understand my problem	.60*
I am flexible switching jobs with coworkers	.57*
I often ask my coworkers for help	.72*
I often volunteer extra help	.67*
I am willing to finish work that is assigned to my coworkers	.65*
My coworkers are willing to finish work that is assigned to me	.70*
Cooperative communication	
Relevant information is exchanged openly among group members.	.62*
In general, it is difficult to approach other group members. (R)	.91*
Group members often criticize other members. (R)	.65*
Some individuals in the workgroup intentionally provide misleading information to other members. (R)	.79*
If disagreements arise, group members are usually able to solve them.	.88*
Workgroup members openly share their ideas with other group members.	.78*
Workgroup members often fail to communicate information to each other. (R)	.72*
Cohesion	
I feel a sense of belonging this workgroup	.86*
I feel that I am a member of this workgroup	.79*
I see myself as part of the workgroup	.77*
I am enthusiastic about this workgroup	.85*
I am happy to be in this workgroup	.66*
This workgroup is one of the best workgroups in this organization	.62*

Note: * indicates a loading significant at $p < .001$. (R) indicates an item reversely coded in data analysis. LMX = Leader–Member Exchange. TMX = Team–Member Exchange. SLMX-MDM = The 12-item scale measuring the supervisors' perspective.

Table 3. Means, Standard Deviations and Intercorrelations Among the Variables.

Variables	*M*	*SD*	1	2	3	4
1. LMX-MDM	3.50	.73	—			
2. SLMX-MDM	3.11	.86	.42**	—		
3. TMX	3.20	.76	.38*	.30*	—	
4. Cooperative communication	3.52	.79	.25*	.29*	.38*	—
5. Perceived cohesion	3.28	.82	.36*	.30*	.35*	.46*

Note: *p < .05. **p < .01. TMX = Team–Member Exchange. SLMX-MDM = SLMX-MDM = The 12-item scale measuring the supervisors' perspective. LMX-MDM = The 12-item scale measuring the subordinates' perspective.

Table 4. Confirmatory Factor Analysis of the Structure of the Measured Variables.

Model	$\chi^2(df)$	$\Delta\chi^2(df)$	CFI	NFI	SRMSR	RMSEA
5-factor	208.70 (42)	—	.97	.99	.04	.09
4-factor	260.04 (40)	125.93 (4)	.87	.80	.12	.32
3-factor	225.74 (40)	1004. 41 (3)	.90	.92	.03	.21
1-factor	307.73 (41)	237.04 (4)	.89	.87	.10	.20

Note: NFI = Normed fit index; CFI = Comparative fit index; SRMSR= Standardized root-mean-square residual; RMSEA = Root mean square error for approximation. All χ^2 and $\Delta\chi^2$ values are significant at p < .01.

respective factors. The satisfactory factor structure indicated clear discriminant validity of all variables, which allowed us to proceed with model testing. See Table 2 for factor loadings and Table 4 for the confirmatory factor analysis summary.

Level of Analysis

Prior to hypothesis testing, we needed to justify that the variables (LMX and TMX) at the individual level and those at the group-level (PCC and perceived cohesion) could be aggregated. The purpose was to determine whether statistical methods, such as hierarchical linear modeling (HLM), were necessary to control between-supervisors or groups (as a supervisor anchors a workgroup) effects. Consistent with Schriesheim et al.'s (2001) suggestion, we determined dyadic LMX agreement, the degree to which a subordinate and the supervisor agree on their leader–member relationship, within each of the 375 matched pairs.

Table 5. WABA I Results.

Variables	Etas		Tests		WABA I inference
	Within	Between	*E* ratio	*F* value	
LMX agreement	.48	.86	1.49*	2.19**	Between
TMX	.42	.87	2.09*	4.56**	Between
Cooperative Communication	.57	.82	1.27*	1.70**	Between
Perceived Cohesion	.45	.89	9.21*	2.72**	Between

Note: *E test significant at 30°. **$p < .05$. 48 managers and 375 manager–employee dyads were included in the analysis. LMX = Leader–Member Exchange. Team–Member Exchange.

First, we conducted two forms of intraclass correlation coefficient (ICC). ICC (1) represents the proportion of variance due to group variability and ICC (2) reflects the extent to which groups are used to differentiate reliably in terms of the individuals' rating of the variables. Bliese (2000) suggested that ICC (1) values close to .20 indicate that the scores are desirable for group-level analysis. For ICC (2), values greater than .60 are desirable (Glick, 1985). The ICC (1) and ICC (2) values calculated with ANOVA were .21 and .46 for LMX agreement, .24 and .39 for TMX, .27 and .65 for perceived cooperative communication, and .28 and .75 for perceived group cohesion.

Because group size easily influences ICC (2) (Castro, 2002), we used the WABA I program to assess whether the observed variation in our measures had within-group or between-groups variations. As shown in Table 5, all variables exhibited greater between-eta correlations than within-eta correlations. Thus, the aggregation of dyadic LMX agreement, TMX, perceived cooperative communication, and perceived cohesion suggests that the variance and covariance were attributable to group-level effects. As such, the WABA I results confirmed that, for dyadic LMX agreement, TMX, cooperative communication, and perceived cohesion, the variance between entities was stronger than within entities. This finding is consistent with Schriesheim et al.'s (2001) explanation, that "if dyads are 'truly' operative, it would seem reasonable to expect more differentiation between groups than within groups" (p. 530). Furthermore, the between-groups variation that was significantly greater than the within-group variation for all variables indicates *systematic* between-groups variance. The WABA I results demonstrated that the individual-level variables could be aggregated, cross-level analysis was appropriate, and hierarchical linear modeling techniques were necessary to test our hypotheses (see Castro, 2002).

Testing the Model and Hypotheses: Hierarchical Linear Modeling

Hierarchical Linear Modeling (HLM) is a stringent, appropriate, and efficient procedure for testing our two-tiered model (Raudenbusch, Bryk, Cheong, & Congdon, 2004). HLM (a) allows simultaneous analyses of multilevel data (e.g., nested structure), which minimizes possible biases (e.g., supervisors' one-sided rating on LMX quality), (b) supports mediation tests, and (c) identifies sources of variance (see Baron & Kenny, 1986). As our sample consisted of dyads in workgroups with each supervisor rating multiple subordinates, supervisors' ratings might not be independent. HLM could detect supervisor's effects while testing our mediation hypotheses.

Our HLM results shown in Table 6 provide support for significant between-groups variation in perceived cohesion, $\tau 000 = .08$, χ^2 (82, $n = 375$) = 96.8, which is similar to our WABA I results (cf. Table 5). These HLM results indicated empirical support for (a) the relationship between dyadic LMX agreement and TMX ($\beta = .44$, $t = 3.85$, $p < .05$), dyadic LMX agreement and perceived cooperative communication ($\beta = .46$, $t = 4.86$, $p < .05$), and the relationship between TMX and perceived cooperative communication ($\beta = .42$, $t = 3.73$, $p < .05$); and (b) the relationship between dyadic LMX agreement and perceived cohesion ($\beta = .40$, $t = 4.06$, $p < .05$), and the relationship between TMX and perceived cohesion ($\beta = .43$, $t = 4.63$, $p < .05$). Clearly, the first two conditions of the mediation test were present. These results supported the links specified in our theoretical model.

Finally, we regressed dyadic LMX agreement, TMX, and perceived cooperative communication on perceived cohesion. Table 6 shows the main effect of dyadic LMX agreement on perceived cohesion ($\beta = .18$, $t = 1.31$, $p > .05$) and the main effect of TMX on perceived cohesion ($\beta = .13$, $t = 1.25$, $p > .05$) was not significant when cooperative communication was entered as a mediator. The overall R^2 of the mediation test was .47. This result demonstrated that (a) cooperative communication at the group level was related to LMX (measured by dyadic agreement) and TMX at the individual level respectively; and (b) cooperative communication mediated the relationship between LMX and perceived cohesion, and the relationship between TMX and perceived cohesion. Thus, Hypotheses 1 and 2 were both supported.

To test possible alternative relationships, we adopted Tse et al.'s (2008) analytical approach and computed statistical significance of the reverse model (TMX-LMX). When the relationship of TMX and LMX was reversed, and the β remained the same; β's for LMX-Perceived Cooperative Communication, TMX-Perceived Cooperative Communication, LMX-Perceived Cohesion, and TMX- Perceived Cohesion remained the same as

Table 6. Hierarchical Linear Modeling: Workgroup Perceived Cohesion.

			Coefficient	χ^2		
			.08*	96.8		
Null Model	TMX		Cooperative Communication		Perceived Cohesion	
Perceived Cohesion γ_{10}	Coefficient	*t*	Coefficient	*t*	Coefficient	*t*
Intercept	2.23*	4.61	3.73*	6.61	4.32*	7.73
Main effects						
LMX agreement τ_{000}	.44*	3.85	.46*	4.86	.40*	4.62
TMX τ_{000}			.42*	3.73	.38*	4.03
R^2			.38		.40	
Mediation effects						
LMX agreement					.18	1.31
TMX					.13	1.25
Cooperative communication γ_{10}					.43*	7.31
R^2					.47	

Note: Level 1, n = 375 employees; Level 2, n = 48 workgroups. Entries are random effects with robust standard error. R^2 = proportion of within-group variance explained by Level 1 predictor and mediator. *p < .05. LMX = Leader–Member Exchange. TMX = Team–Member Exchange.

well, indicating no significant mediation effects of cooperative communication. These results lend support to our proposed model but not the reversed model.

Discussion

We proposed a multilevel model in which cooperative communication mediates interpersonal exchange relationships and group cohesion. Our findings validated the model that emphasizes the role of communication in group processes.

The Central Role of Communication in Group Processes

At the macro level, the mediating effects of perceived cooperative communication on group behaviors clearly support Weick's argument that communication is the central binding force of all organizational activities (Weick,

1969). In the context of workgroups, our findings also showed perceived cooperative communication, such as information exchange, opinion sharing, and agreement seeking among group members, directly influenced cohesion, the group outcome behavior in our model (cf. Lee, 2001). The impact of interpersonal exchange relationships (i.e., LMX and TMX) on group cohesion varied according to the level of perceived cooperative communication.

Contribution to the LMX and TMX Literature

Previous research on LMX-related group behavior focused on identifying individual and contextual factors predicting relationship development in workgroups (e.g., Polzer, Milton, & Swann, 2002; Sias & Cahill, 1998). We account for the dyadic nature of LMX by measuring LMX in terms of the agreement between a subordinate and his or her supervisor. Our multilevel approach identified both cooperative communication and cohesion as group-level constructs, unlike most previous research in which these two constructs were analyzed at the individual level. As predicted, our HLM results validated the significant cross-level effect of cooperative communication and group cohesion as an outcome attributable to both within-group interpersonal exchanges and between-groups variability (e.g., different industry sectors).

The finding that TMX contributed to group cohesion suggests that the traditional leadership approach focusing on LMX may be inadequate. Rather, the effectiveness of a leader is likely the result of his or her ability, both to develop the dyadic exchange relationship with each subordinate and to foster quality lateral exchange relationships among all subordinates. Furthermore, TMX, the whole of peer relationships in group, perhaps is a more important antecedent to group outcomes in a collectivist culture than in an individualist culture.

Our LMX- and TMX-based model derived from relevant literature made up of predominantly Western research. We empirically validated the model with a Malaysian sample. Thus, communication-centeredness and LMX principles appear to have exhibited some degree of cross-cultural validity. Nonetheless, our mediation model of perceived cooperative communication likely belies rich collectivist work culture in Malaysian organizations where coordination, mutual help, work task integration, and concerted pursuit of group goals are norm (see Chan & Pearson, 2002).

Practical Implications

The main practical implications are related to the central role of communication in group processes and TMX as a leadership responsibility. The dynamic

nature of communication can change group outcomes directly and change the impact level of leader–member relationship on group outcomes. We suggest that managers initiate and encourage information sharing and constructive negotiation among group members to strengthen group cohesion and identity. More importantly, our finding that TMX contributed to group cohesion explicitly brought TMX to the foreground of management. Specifically, managers not only need to develop vertical relationships with subordinates, but they need to foster lateral exchange relationships among subordinates themselves. Our TMX findings challenge the adequacy of the prevailing leadership training practice that focuses on skills to develop leader-anchored, vertical relationships.

Limitations and Future Research

The cross-sectional nature of the data does not eliminate the possibility that causal relationships described in the model can be reversed. First, although our additional tests helped us to rule out the reversal causation statistically, experimental and longitudinal research is needed to establish true causation. Second, the supervisor–subordinate agreement score as the current measure for LMX did well in capturing the perspectives of both parties but at the cost of its inability to encompass rich aspects of exchange quality. Future research can use a composite agreement score that also captures key aspects of exchange quality. Third, cooperative communication was measured via perception which may deviate from what actually has happened. Future research can record and content-analyze actual interactions. The cooperative communication measure (Lee, 2001) adopted in this study treats the construct largely as overall communication culture. Alternative measures can be developed to examine a collection of specific cooperative communication behaviors. Fourth, TMX was measured as individual assessment. Researchers can also use a group-based measure for the sum of all TMXs, which then would warrant TMX to be placed as a group-level construct for testing the likes of our multilevel model. Fifth, our sample was restricted to only Malaysian respondents. Samples with respondents from other countries should be considered to enhance the generalizability of the model. Sixth, the dyads and workgroups included in the sample may underrepresent the actual dyad population at large.

This study examined only group cohesion, and other outcomes may be equally relevant to our model. Future research should probe further as to whether communication, too, mediates the relationships between interpersonal exchanges and other key group outcomes such as collective performance, conflict resolution, and employee turnover. Finally, for management training purposes, future research should profitably investigate the specific communication acts and behaviors that managers and workgroup members

consider cooperative. Through cooperative communication training, organizational outcomes can be enhanced.

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